



UNITED STATES PATENT AND TRADEMARK OFFICE

COMMISSIONER FOR PATENTS
UNITED STATES PATENT AND TRADEMARK OFFICE
WASHINGTON, D.C. 20231
www.uspto.gov

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

2. Authorization for this examiner's amendment was given in a telephone interview with Mr. Robert Kowert (reg.39,255).

3. The applicant has been amended as follow:

1. (Currently amended) A system, comprising:

a plurality of servers in a cluster, wherein each server comprises a respective timer service of a plurality of timer services and is configured to execute one or more application instances; and

a failure detection service operable to detect a failure in the plurality of servers in the cluster;

wherein each given timer service of said plurality of timer services is operable to:

service timer requests from the one or more application instances on the respective server that comprises said given timer service;

in response to the failure detection service detecting a failure of an other timer service of said plurality of timer services on an other server of said plurality of servers, ~~assume take over~~ one or more pending timer requests of the other timer service, wherein, prior to the failure detection service detecting said failure, said one or more pending timer requests are designated to be serviced by said other timer service in the cluster; [[and]]

wherein upon taking over the one or more pending timer requests from said other timer service, the given timer service is operable to service said one or more pending timer requests by providing one or more missed timer notifications to one or more of the application instances, wherein each given timer service configured to take over the one or more pending timer requests from said other timer service is operable to service said one or more pending timer requests by delivering one or more missed timer notifications to a fail-over application instance; and

service the one or more pending timer requests ~~assumed taken over~~ by the given timer service.

2. (Currently amended) The system of claim 1, wherein each given timer service of said plurality of timer services is further operable to:

wait for a specified time period prior to ~~assuming taking over~~ the one or more pending timer requests of the other timer service in the cluster after the failure detection service detects the failure of said other timer service; and

~~assume take over~~ the one or more pending timer requests in response to determining that said other timer service has not recovered from the failure within the specified time period.

3. – 4. (Canceled)

5. (Previously presented) The system of claim 1, further comprising a timer database storing information indicating one or more pending timer requests as designated to be serviced by respective ones of said plurality of timer services.

6. (Currently amended) The system of claim 5, wherein each timer service of said plurality of timer services is operable to acquire information indicating the one or more pending timer requests designated to be serviced by said other timer service from the timer database upon ~~assuming taking over~~ the one or more pending timer requests from the other timer service.

7. (Previously presented) The system of claim 1, wherein each server is configured to execute a respective instance of the failure detection service.

8. (Currently amended) The system of claim 1, wherein each of said one or more pending timer requests of said other timer service is ~~assumed taken over~~ by only one respective timer service in the cluster.

9. (Currently amended) A method, comprising:

executing each of a plurality of application instances on a respective server of a plurality of servers in a cluster;

for each of one or more timer requests from one or more of the plurality of application instances executing on a particular server of said plurality of servers, servicing the timer request via a given timer service located on the particular server;

detecting a failure of the given timer service, wherein, prior to the detection of said failure, one or more pending timer requests are designated to be serviced by said given timer service;

in response to detecting said failure, each of one or more other timer services executing on one or more of the plurality of servers assuming taking over at least one of said one or more pending timer requests from said given timer service in the cluster; [[and]]

subsequent to taking over the one or more pending timer requests from the failed timer service, providing via said one or more other timer services one or more missed timer notifications to the one or more application instances, wherein said providing one or more missed timer notifications to the one or more application instances comprises delivering said one or more missed notifications to a fail-over application instance; and

for each given pending timer request assumed taken over by a respective timer service of said one or more other timer services, servicing the given pending timer request via the respective timer service that assumed took over said given pending timer request.

10. (Currently amended) The method of claim 9, further comprising:

at least one of said one or more other timers services waiting for a specified time period prior to said assuming taking over the one or more pending timer

requests from the given timer service in the cluster after detecting said failure of the given timer service; and

said at least one of said one or more other timer services ~~assuming taking over~~ the one or more pending timer requests in response to determining that said given timer service has not recovered from the failure within the specified time period.

11. – 12. (Canceled)

13. (Previously presented) The method of claim 9, further comprising storing information indicating the one or more pending timer requests in a timer database accessible to said one or more other timer services.

14. (Currently amended) The method of claim 13, further comprising acquiring, via the one or more other timer services, the information indicating the one or more pending timer requests from the timer database subsequent to ~~assuming taking over~~ the one or more timer operations from the given timer service that has failed.

15. (Previously presented) The method of claim 9, wherein each server of the plurality of servers in the cluster comprises an instance of a timer service and an instance of a failure detection service to detect failures of timer services on other servers of the plurality of servers in the cluster.

16. (Currently amended) The method of claim 9, wherein each pending timer request of said given timer service is ~~assumed taken over~~ by a different timer service in the cluster.

17. (Currently amended) A computer accessible medium storing computer-executable program instructions configured to implement a plurality of instances of a

Art Unit: 2144

distributed timer service, wherein each instance of the distributed timer service is configured to:

service one or more timer requests from one or more application instances executing on a server on which the instance of the distributed timer service is executing, wherein said server is one of a plurality of servers in a cluster;

receive notification of a failure of an other instance of the distributed timer service executing on another server of said plurality of servers in the cluster, wherein, prior to said failure of said other instance of the distributed timer service, one or more pending timer requests are designated to be serviced by said other instance of the distributed timer service;

in response to said notification, assume take over one or more pending timer requests from the other instance of the distributed timer service in the cluster; [[and]]

providing one or more missed timer notifications to the one or more application instances subsequent to taking over the one or more pending timer requests from the other instance of said distributed timer service, wherein said providing one or more missed timer notifications to the one or more application instances comprises delivering one or more missed notifications to a fail-over instance of an application that originally requested the timer operation from the other instance of the distributed timer service; and

for each pending timer request that is assumed taken over, servicing the pending timer request.

18. (Currently amended) The computer accessible medium of claim 17, wherein each instance of the distributed timer service is further configured to:

after receiving said notification, wait for a specified time period prior to assuming taking over the one or more pending timer requests from the other instance of the distributed timer service in the cluster; and

assuming taking over the one or more pending timer requests in response to determining that the other instance of the distributed timer service has not recovered from the failure within the specified time period.

19. – 20. (Canceled)

21. (Previously presented) The computer accessible medium of claim 17, wherein each instance of the distributed timer service is configured to store information in a timer database, said information indicating one or more timer requests.

22. (Currently amended) The computer accessible medium of claim 21, wherein each instance of the distributed timer service is configured to acquire information indicating the one or more pending timer requests of the other instance of the distributed timer service from the timer database subsequent to assuming taking over the one or more pending timer requests from the other instance of the distributed timer service.

23. (Previously presented) The computer accessible medium of claim 17, wherein an instance of said distributed timer service is configured to run on each server of the plurality of servers in the cluster.

24. (Currently amended) The computer accessible medium of claim 17, wherein each instance of the distributed timer service is configured to not assume take over a

Art Unit: 2144

particular timer operation of the failed timer service instance in response to a determination that another instance of the distributed timer service in the cluster has already assumed taken over the particular timer operation.

4. The following is an examiner's statement of reasons for allowance:

With respect to claims 1-2, 5-10, 13-18, and 21-24, the prior art of record, individually or in combination, fails to teach, suggest or render obvious the claimed invention in combination with Applicants' arguments.

5. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tammy T. Nguyen whose telephone number is 571-272- 3929. The examiner can normally be reached on Monday - Friday 8:30 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **William Vaughn** can be reached on 571-272-3922. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status

Art Unit: 2144

information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Thanh Tammy Nguyen/

Primary Examiner, Art Unit 2144